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U.S. Fish & Wildlife Service

Final Recovery Plan for the Endangered Speckled Dace of Clover and Independence Valleys

(Rhinichthys osculus lethoporus and Rhinichthys osculus oligoporus)

NE98-027478

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Recovery Plan

for the

Endangered Speckled Dace
of
Clover and Independence Valleys

(*Rhinichthys osculus lethoporus*
and
Rhinichthys osculus oligoporus)

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EXECUTIVE SUMMARY

Current Status: Endangered. Independence Valley speckled dace (*Rhinichthys osculus lethoporus*) inhabit the Independence Valley Warm Springs system in Elko County, Nevada, and it is the only system from which these fish are known. Clover Valley speckled dace (*Rhinichthys osculus oligoporus*) reside in three spring systems in Clover Valley in Elko County, Nevada. These springs are Clover Valley Warm Springs, Bradish Spring, and Wright Spring.

Habitat Requirements and Limiting Factors: Currently, the habitat requirements of both speckled dace subspecies are unknown. Before determining what habitat is required for either speckled dace to exist into perpetuity, it is important to determine to what extent their current distribution reflects their historical distribution. Primary threats to each species at the time of listing were a limited distribution, habitat manipulation, small population size, and nonnative fish introductions.

Recovery Objective: Delisting

Downlisting Criteria: Independence Valley speckled dace may be considered for reclassification from endangered to threatened when (1) the population at Independence Valley Warm Springs comprises at least two age classes, the population size is stable or increasing, and reproduction is documented for at least 3 consecutive years; and (2) nonnative fishes no longer adversely affect the long-term survival of the Independence Valley speckled dace.

Clover Valley speckled dace may be considered for reclassification from endangered to threatened when the population at each of the three springs (Clover Valley Warm Springs, Wright Ranch Spring, and Bradish Spring) comprises at least two age classes, the population size is stable or increasing, and reproduction is documented for at least 3 consecutive years.

Delisting Criteria: The Independence Valley speckled dace may be considered for delisting provided that all reclassification criteria have been met and when (1) Independence Valley speckled dace occupy at least 75 percent of the total available habitat after enhancement, if needed, within the Independence Valley Warm Springs system; and (2) the population exists at the aforementioned level (downlisting criteria) for a minimum of one generation (approximately 7 years); and (3) long-term protection of Independence Valley speckled dace populations from nonnative fish and other factors and long-term protection of speckled dace habitat is guaranteed.

Clover Valley speckled dace may be considered for delisting provided that all reclassification criteria have been met and when (1) Clover Valley speckled dace occupy at least 75 percent of the total available habitat after enhancement, if needed, within the each spring system (Clover Valley Warm Springs, Wright Ranch Spring, and Bradish Spring); (2) the population exists at the aforementioned level (downlisting criteria) for a minimum of one generation (approximately 7 years); and (3) long-term protection of Clover Valley speckled dace populations and habitat is guaranteed.

Actions Needed:

1. Protection, restoration, and management of both the Clover Valley and Independence Valley speckled dace habitats.
2. Determination of Clover Valley and Independence Valley speckled dace biology and their habitat requirements.
3. Provide public information and education.
4. Evaluate progress of recovery and revise management plans and recovery criteria.

Implementation Participants: Private landowners, Nevada Division of Wildlife, Bureau of Land Management, Biological Resources Division-U.S. Geological Survey, U.S. Fish and Wildlife Service.

Total Estimated Cost of Recovery ($1,000's):

Year	Need 1	Need 2	Need 3	Need 4	Total
1998	75	113	18 + TBD	2	208 + TBD
1999	47	125	9 + TBD	2	183 + TBD
2000	47	57	9 + TBD	2	115 + TBD
2001	17	13	9 + TBD	2	41 + TBD
2002	17	13	9 + TBD	2	41 + TBD
Total	**203**	**321**	**54 + TBD**	**10**	**588 + TBD**

Total costs over the next 10 years:

	288	**396**	**54 + TBD**	**20**	**758 + TBD**

TBD: To be determined.

Date of Recovery: Reclassification of the endangered speckled dace in Clover and Independence Valleys to threatened may begin within three years if the downlisting criteria have been met. Delisting should be initiated in 2005, if recovery criteria are met.

TABLE OF CONTENTS

I. INTRODUCTION 1
A. Brief Overview 1
B. Species Description 5
C. Distribution 6
Clover Valley Speckled Dace 6
Clover Valley Warm Springs 6
Wright Ranch Spring 8
Bradish Spring 9
Independence Valley Speckled Dace 9
Independence Valley Warm Springs 9
D. Habitat and Ecosystem 10
Clover Valley 11
Clover Valley Warm Springs 12
Wright Ranch Spring 13
Bradish Spring 15
Independence Valley 15
Independence Valley Warm Springs 15
E. Life History and Habitat Requirements 17
F. Associated Species 19
G. Reasons for Listing 21
H. Resource Conflicts 23
I. Conservation Measures 24
J. Recovery Strategy 29

II. RECOVERY 30
A. Objective and Criteria 30
B. Narrative Outline of Recovery Actions 33

III. LITERATURE CITED 41

IV. IMPLEMENTATION SCHEDULE 43

V. APPENDICES 46

LIST OF FIGURES

Figure Page

1 Geographic location of Independence and Clover Valleys, Elko County, Nevada 2

2 Location of the three spring systems where Clover Valley speckled dace have been found 3

3 Independence Valley Warm Springs system 4

I. INTRODUCTION

A. Brief Overview

Two subspecies of speckled dace, the Clover Valley speckled dace (*Rhinichthys osculus oligoporus*) and the Independence Valley speckled dace (*Rhinichthys osculus lethoporus*), were concurrently federally listed as endangered pursuant to the Endangered Species Act of 1973, as amended (Act) on October 10, 1989 (U.S. Fish and Wildlife Service 1989). Although historical ranges and current population numbers are unknown for these fishes, both were considered rare when first collected. It is probable, however, that they occupied all of the streams and wetlands maintained by their respective local spring discharges.

Clover Valley in Elko County, Nevada (Figure 1), is the only known location for the endangered Clover Valley speckled dace. As of the latest comprehensive survey (Stein 1995), Clover Valley speckled dace occupy only three spring systems in the valley: Bradish Spring, Clover Valley Warm Springs, and Wright Ranch Spring (Figure 2). These speckled dace were historically found only in Clover Valley Warm Springs and the Wright Ranch Spring, but they were discovered in Bradish Spring in 1983 (Vinyard 1984). The U.S. Fish and Wildlife Service has given this fish a recovery priority of 9C, signifying a moderate degree of threat and conflict with other resource uses, but a high recovery potential.

Independence Valley, also in Elko County, Nevada (Figure 1), currently provides habitat for the Independence Valley speckled dace (*Rhinichthys osculus lethoporus*). This subspecies of speckled dace is found only in the marsh of the largest spring system in the valley, known as Independence Valley Warm Springs (Figure 3). It has a recovery priority of 6C, indicating a high degree of threat, conflict with other resource uses, and a low recovery potential.

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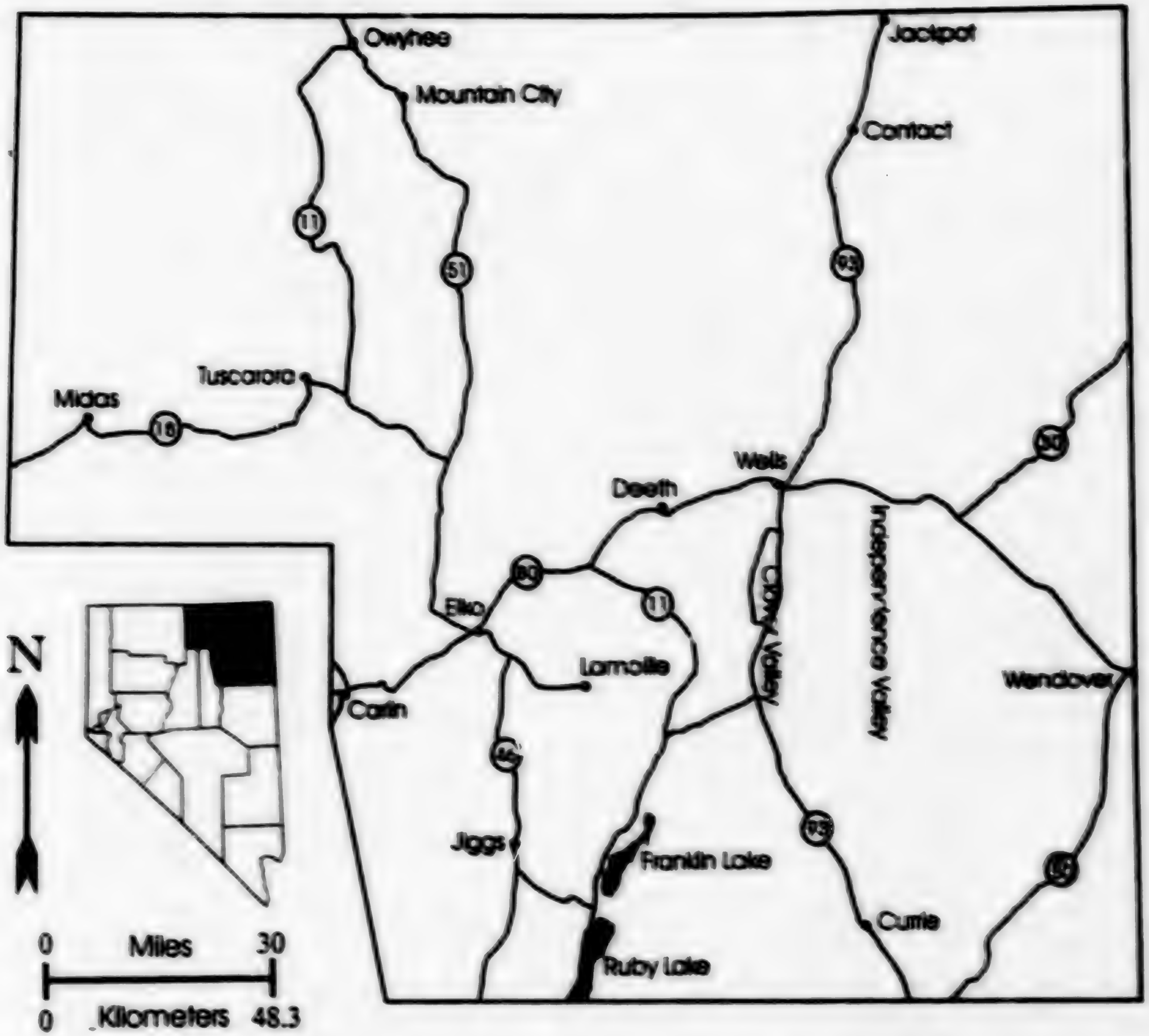

Figure 1. Geographic location of Independence and Clover Valleys, Elko County, Nevada.

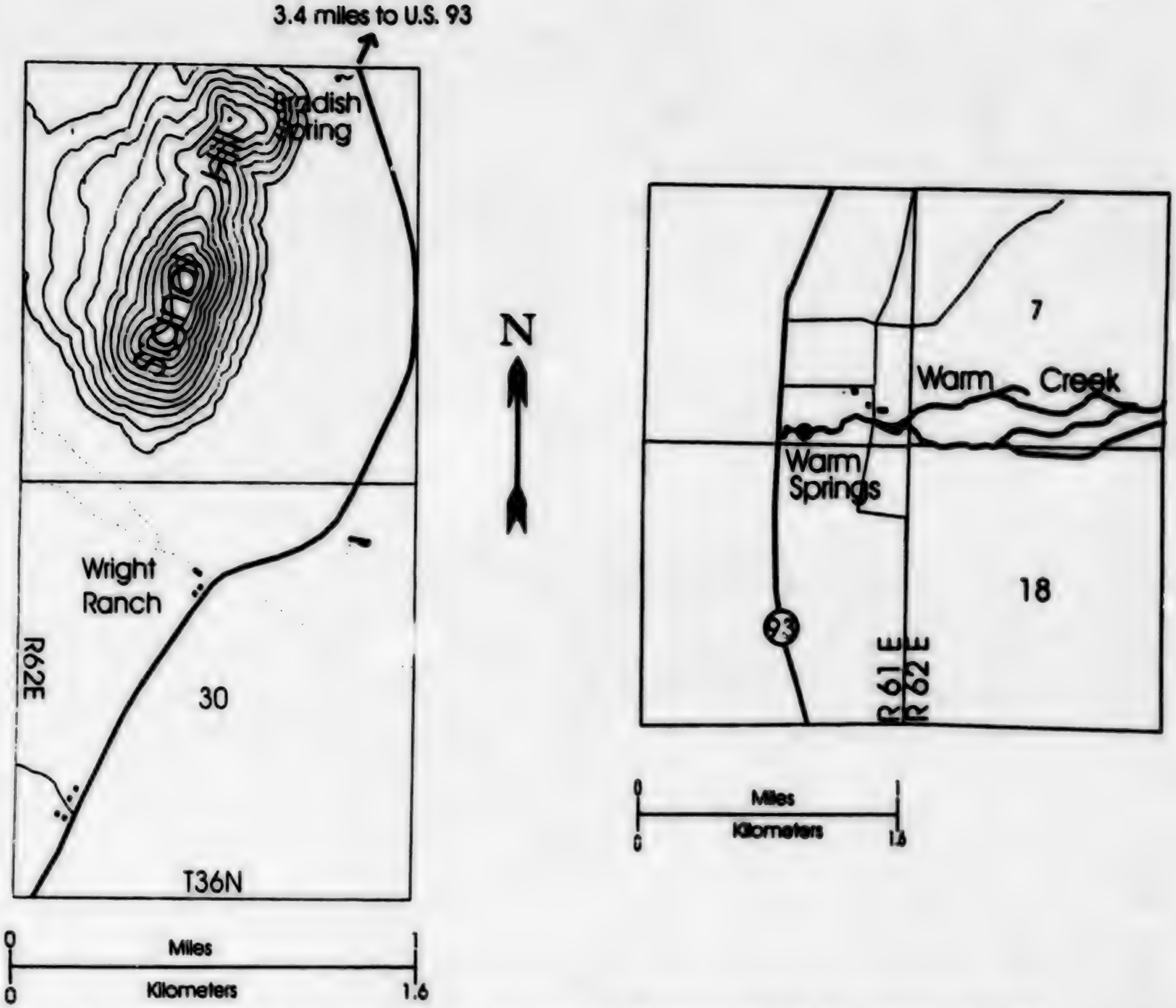

Figure 2. Location of the three spring systems where Clover Valley speckled dace have been found.

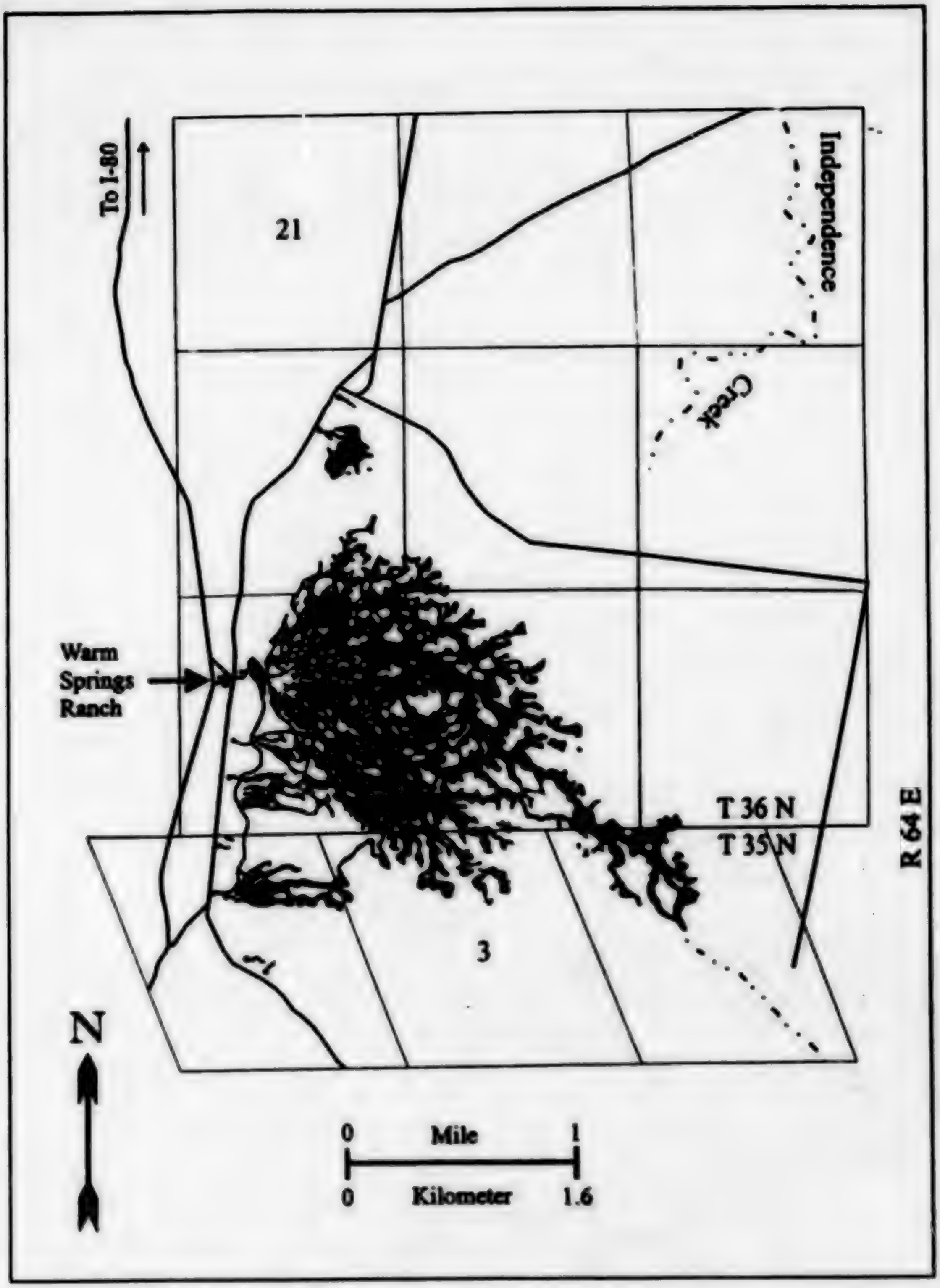

Figure 3. Independence Valley Warm Springs system.

The decline of these fishes has been attributed to their limited distribution, habitat disturbances, and introductions of nonnative fishes. Their recovery will require the cooperation of the landowners, habitat enhancement, and the control and/or removal of nonnative fish species for the Independence Valley speckled dace.

B. Species Description

Speckled dace are divided into twelve species and numerous subspecies, many of which are still undescribed. Speckled dace have a variety of common names such as western dace, pacific dace, dusky dace, etc. (Moyle 1976). The word dace is derived from a Middle English word that gave rise to the word dart. *Rhinichthys* means snout-fish and *osculus*, refers to the small mouth.

Speckled dace tend to be small species (approximately 90 millimeters [3.5 inches] or less in total length as measured from the tip of the snout to the end of the tail fin) and are distinguished by subterminal mouths (below and slightly behind the tip of the snout), small scales, thick tails (caudal peduncle), and slender bodies. Their color is a highly variable shade of olive, but usually consists of dark blotches on the rear half of the fish that often combine to form a dark lateral (side) band (Moyle 1976). The bases of the fins of both sexes turn orange to red during the breeding season and males may or may not develop tubercles (bumps) on the pectoral fins (side fins behind gills).

Both endangered subspecies are thought to be derived from an ancestral form of speckled dace similar to the Lahontan speckled dace (*Rhinichthys osculus robustus*) found in the Humboldt River system immediately to the north. A connection between the valleys was thought to have occurred prehistorically, during the Pleistocene; however, no evidence of any recent connection has been found. Presumably, these subspecies have been separated for thousands of years (Hubbs *et al.* 1974, Hubbs and Miller 1972).

Though the Clover Valley speckled dace and Independence Valley speckled dace were first collected in 1934 and 1965, respectively, neither was described as a separate subspecies until 1972 (Hubbs and Miller 1972). Both have less-developed lateral line (sensory organ) systems and typically lack a frenum (piece of skin connecting the lips and snout) and whiskers, which distinguishes these subspecies from the Lahontan speckled dace. Both are also more extensively speckled with black than the Lahontan speckled dace, but the Independence Valley speckled dace's black pigmentation tends to extend further downward on the tail than on the Clover Valley speckled dace. The Independence Valley speckled dace tends to be smaller (approximately 40 millimeters [1.6 inches] or less in total length) than the Clover Valley speckled dace (approximately 55 millimeters [2.2 inches] or more in total length) and has a relatively longer head and larger eye. It differs further from the Clover Valley speckled dace in having fewer pectoral fin rays (supports) and a straighter, more slanted mouth. The Clover Valley speckled dace has a more rounded head, and its entire body is bulkier. A more detailed description of both speckled dace may be found in Hubbs *et al.* (1974) and Hubbs and Miller (1972).

C. Distribution

The historically occupied habitats of both the Clover Valley and Independence Valley subspecies of speckled dace are unknown; however, other closely related dace species occur throughout streams and wetlands in other areas maintained by local spring discharges.

Clover Valley Speckled Dace

Clover Valley Warm Springs. This spring, also known as Clover Spring, was first examined in 1934. Although no fish were observed at that time, they may have been inactive and difficult to see due to freezing air temperatures the previous night (Hubbs *et al.* 1974). Thirty years later, the spring was reexamined by Hubbs *et al.* (1974), and sizeable populations of speckled dace were observed in the deep reservoir, while fish were uncommon in the outflow ditch. The following year, in 1965, no fish were seen in the clear water of the reservoir, main spring inlet, main outflow ditch, or in the smaller springs and outflows in the meadows downstream. Only young fish were found in the inflow between the main spring and reservoir. Introduced rainbow trout (*Oncorhynchus mykiss*), stocked prior to the second visit, appeared to be forcing the speckled dace into areas not previously occupied.

Clover Valley Warm Springs was intensively seined in both May and September of 1983, and no fish were found (Vinyard 1984). The absence of the speckled dace was attributed to the new modifications of the irrigation ditches and the presence of rainbow trout. In 1988, University of Nevada, Reno and U.S. Fish and Wildlife Service personnel rediscovered the speckled dace in the main outflow ditch approximately 300 meters (1,000 feet) downstream of the reservoir. Speckled dace were also observed in the outflow ditches by Nevada Division of Wildlife and U.S. Fish and Wildlife Service personnel in October 1994.

In October 1995, the Nevada Division of Wildlife surveyed the Clover Valley Warm Springs area and the two outflows for distribution and population numbers of Clover Valley speckled dace (Stein 1995). There are two outflows for this spring: presumably the original channel and an irrigation ditch. At the time of the survey, water was being diverted down the original channel. In order to adequately survey the original channel, it was divided into two distinct sections. In the first section, measuring 859.5 meters (2820 feet), 120 speckled dace averaging 43 millimeters (1.7 inches) in total length were captured in a 7.6-meter (25-foot) transect. The resulting population estimate for section one was 13,500 speckled dace with a maximum total length of 76 millimeters (3.0 inches). In the second section, which measured approximately 1767.8 meters (5800 feet), two separate transects were sampled (Stein 1995). An average of 45 speckled dace were captured for every transect, resulting in a population estimate of 10,440 speckled dace for the second section. The speckled dace measured an average of 38 millimeters (1.5 inches) total length with a maximum size of 64 millimeters (2.5 inches).

Wright Ranch Spring. When first collected in the spring system in 1934, speckled dace were scarce and mostly small; only one adult was collected (Hubbs *et al.* 1974). Trout were stocked in the spring, and the water was used for irrigation of hay meadows. The landowner at the time stated that the speckled dace had been larger and more abundant in previous years. Anecdotal data from the current landowner suggests that speckled dace have been present in this spring, once called Fish Spring, since the late 1860's (Bob Wright, *in litt.* 1988). He also states that speckled dace have been present on the property since its purchase in 1954 and are easily seen during the summer, but disappear in the winter. In 1965, a year of heavy precipitation, the speckled dace population had returned to previous levels of abundance with adult fish more common; trout were not observed (Hubbs *et al.* 1974). In May and September of 1983, speckled dace were fairly common with 16 speckled dace captured in the outflow and 82 in the reservoir (Vinyard 1984). University of Nevada, Reno and U.S. Fish and Wildlife Service personnel visiting the spring in 1988 observed only one small speckled dace in the reservoir along with four large trout. Access to the property was only recently granted so no data or information was collected from 1989 to 1995.

Biologists from the Nevada Division of Wildlife visited this site on October 17, 1995, and visually estimated a total of 1,500 speckled dace in the pond at Wright Ranch Spring (Stein 1995). There are three outflows from the pond: a northern outflow, a middle outflow (presumably the original channel), and a southern outflow. A total of 79 speckled dace, averaging 34 millimeters (1.3 inches) total length (maximum length 43 mm [1.7 inches]), were captured in one 7.62-meter (25-foot) transect of the northernmost outflow. The outflow length was calculated to be 1,219 meters long (4,000 feet), with a population estimate of 12,640 speckled dace for this outflow (Stein 1995). The middle outflow/original channel had very little flowing water and was choked with vegetation. No fish were seen or taken while sampling the middle outflow. The southernmost irrigation ditch had a large volume of standing water. A visual survey showed speckled dace were present here, but in low numbers. The population estimate for the southern ditch was 500 fish within the first 500 meters (1640.5 feet) (Stein 1995). No trout were observed anywhere on the property during this survey.

Bradish Spring. Bradish Spring was not considered speckled dace habitat in the early literature. Hubbs *et al.* (1974) did not report sampling this spring during their visits to the valley. Possible explanations are (1) this spring was not checked during the original visits, but it still represents a natural basin with a native population; (2) this population comprises fish stocked from the Wright Ranch Spring; or (3) this population may be composed of speckled dace from the Wright Ranch Spring that entered the spring through the irrigation system and outflow channel. No evidence (i.e., papers, memos, communication with State, Federal, or local contacts) exists that indicates these fish were stocked. It seems more plausible that this spring was overlooked during the initial surveys due to its small area and remote location. For these reasons, the population at this spring will be considered a historical population for recovery purposes.

Bradish Spring was first surveyed by observation in May 1983, and no fish were seen (Vinyard 1984). In August 1983, a total of 56 speckled dace were caught using unbaited minnow traps. High numbers of fish were also observed in September 1983 (Vinyard 1984). Fish were still common in 1988 when the spring was reexamined (McNatt *in litt.* 1988). Although speckled dace probably still occur in Bradish Spring, no distribution and population data are available. Permission to access the property has not been obtained.

Independence Valley Speckled Dace

Independence Valley Warm Springs. In 1965, the first survey conducted for this fish found them to be scarce and secretive in the spring system (Hubbs *et al.*

1974). Vinyard (1984) conducted an intensive survey in 1983, and only 33 Independence Valley speckled dace were minnow trapped from the lower marsh. The Nevada Division of Wildlife surveyed the area in 1992 and captured only one speckled dace in the shallowest area of the marsh (Heinrich 1993). In October 1994, Nevada Division of Wildlife and U.S. Fish and Wildlife Service personnel collected and released 5 individuals and observed approximately 20 more in the extensive marsh area. Permission for surveying this area was obtained in 1997, so data concerning the distribution and population of this fish will be forthcoming from the Biological Resources Division of the U.S. Geological Survey.

Based on general habitat characteristics of other closely related dace species, the Independence Valley speckled dace should have been found throughout the Independence Valley Warm Springs system, not just the marshy area below the springs. It is believed that the historical range of the Independence Valley speckled dace was throughout the spring system and its associated marsh. The vast marsh area (Figure 3) has not been intensively surveyed in the past 11 years so the current distribution is unknown. It is unclear whether the distribution of the Independence Valley speckled dace has expanded or diminished since the subspecies was listed.

D. Habitat and Ecosystem

Clover and Independence Valleys are in the south-central part of Elko County, Nevada (Figure 1). The north end of Clover Valley is approximately 8 kilometers (5 miles) from the town of Wells, and it extends southward approximately 56 kilometers (35 miles). Independence Valley lies adjacent to and east of Clover Valley. The south end of Independence Valley begins at the same latitude as the southern end of Clover Valley and extends northward about 77 kilometers (48 miles). It is approximately 24 kilometers (15 miles) southeast of Wells.

Both Clover and Independence Valleys occupy an elongate basin, which runs roughly north-south (Eakin and Maxey 1951). The East Humboldt Range and its low-lying southern extension, Valley Mountain, form the western border of the area. Spruce Mountain and its low east-west ridges bound the area on the south and the Pequop Mountains are the eastern edge. An irregular ridge composed of bedrock and alluvial fill (sediments laid down by flowing water) forms the northern margin. In years of heavy runoff, discharge may occur from Clover Valley to Independence Valley through a poorly developed drainage midway between the two valleys. Together the two valleys form a closed hydrologic basin with a drainage area of approximately 2,525 square kilometers (975 square miles) (Eakin and Maxey 1951).

The climate of both valleys is arid to semiarid and is characterized by low precipitation on the valley floor. A wide range of temperatures exists, both seasonally and daily, with low humidity and high evaporation. Precipitation increases generally with altitude in the adjacent mountains, to approximately 89 centimeters (35 inches) per year. Precipitation on the floor of Independence Valley averages between 13–20 centimeters (5–8 inches) and between 13–30.5 centimeters (5–12 inches) for Clover Valley (Eakin and Maxey 1951).

Native vegetation on the valley floors is primarily big greasewood (*Sarcobatus vermiculatus*), big rabbit brush (*Chrysothamnus nauseosus*), sagebrush (*Artemisia tridentata*), shadscale (*Atriplex confertifolia*), white sage (*Eurotia lanata*), and saltgrass (*Distichlis spicata*). Meadow hay and alfalfa are also grown in Clover Valley for livestock feed.

Clover Valley

Ground water in Clover Valley is derived principally from precipitation on the east slope of the East Humboldt Range and to a lesser extent from the north side of Spruce Mountain and the west slope of the Chase Spring Mountains. Gravity-fed springs and seeps issue from the lower alluvial slopes along the west side of the valley and are used primarily for supplemental irrigation of meadows. The three spring systems in the valley currently inhabited by the Clover Valley speckled dace are Clover Valley Warm Springs, Wright Ranch Spring, and Bradish Spring. All of these springs are privately owned and have been modified to provide water for agricultural purposes.

Clover Valley Warm Springs. This spring (located in Township 33 North, Range 61 East, Southeast ¼ of Section 12) issues from alluvium and is impounded immediately downstream of the springhead into a small reservoir approximately 3 meters wide and 0.6 meter deep (10 x 2 feet) (Vinyard 1984). The discharge at the spring head is 1.9 cubic meters per second (6.24 cubic feet per second), and further downstream below the reservoir, there are numerous seeps that add approximately 1.8 meters per second (5.84 feet per second) to the flow. Temperatures recorded in the spring system have ranged from 18.5 to 19.3 degrees Celsius (65 to 67 degrees Fahrenheit) and seem to change accordingly with ambient air temperature further downstream. The dissolved oxygen content in May 1983 was 5.3 milligrams per liter (= parts per million) (Vinyard 1984).

There are two outflows from the reservoir. One is an irrigation channel that can either divert water to the north or return it to the original channel (Stein 1995). The second channel, the original channel, consists of two discernable sections. The first section, approximately 859.5 meters (2,820 feet) long, extends from the reservoir through the historic channel to a fence line 500 meters (1,640.5 feet) to the east.

The riparian areas are composed primarily of sedges (*Carex* sp.) and grasses while rush (*Juncus* sp.) and hard-stem bulrush (*Scirpus* sp.) are common (Stein 1995). Several types of mesic forbs were found only occasionally in the riparian zone. Aquatic vegetation was mostly watercress (*Rorippa nasturtium-aquaticum*) and algae (*Chara* sp.).

Surveys found this section to be relatively rich in aquatic insects. Leeches, scuds (amphipod crustaceans, such as beach fleas), caddis flies, and native snails were all abundant in the channel (Stein 1995). While dragon fly larvae were common, nonnative snails were found occasionally, and giant water bugs were rarely encountered. This section also had the highest population estimate (13,500 speckled dace).

The second section of the original channel comprises split channels and irrigation structures. The irrigation section showed signs of heavy livestock use and portions of the section were well-entrenched with severe signs of compaction (Stein 1995). The aquatic insect and plant components were similar to those found in the first section, but generally lower in abundance. Riparian vegetation was also reduced throughout this section with nonvegetated soils constituting one-quarter of the stream banks. Grass and rush were common, with mesic forbs and rabbit brush (*Chrysothamnus* sp.) found occasionally (Stein 1995). The speckled dace population estimate was lower (10,440 speckled dace) in this section.

In the past, irrigation practices completely dewatered the natural stream channel during the summer. Water from the stream is used primarily for irrigation of meadows.

Wright Ranch Spring. Wright Ranch Spring is located at the southeast corner of Signal Hill (Township 36 North, Range 62 East, Northeast ¼ of Section 30) and issues from a limestone-alluvial contact. Water is immediately impounded in a small reservoir measuring roughly 80 meters (262 feet) in diameter. The flow has been estimated at 0.305 meter per second (1 foot per second). In 1983, water was either pumped southward into a series of irrigation ditches or allowed to overflow the dam and enter the original stream channel (Vinyard 1984). The reservoir was used as a stock pond, especially in winter when cattle had continuous access.

In 1995, emergent cattails (*Typha* sp.) were abundant around the rim of the reservoir. Algae was abundant, both as large floating mats and lining the bottom of the reservoir (Stein 1995). Pondweed (*Potamogeton* sp.) was also common and filled approximately one-half of the water volume of the reservoir. Willows (*Salix exiguia*) were common around the border of the reservoir, with some wild rose (*Rosa woodsii*) scattered throughout. Speckled dace of various sizes were present in the reservoir.

In 1995, three separate outflows flowed to the east from the pond. Both the northernmost and southernmost channels are irrigation ditches. Of the three, the northernmost had the largest flow (approximately 1–2 cubic feet per second [0.028–0.057 cubic meters per second]) and a water temperature of 14.4 degrees Celsius (58 degrees Fahrenheit) at the time of sampling. Stein (1995) described it as a long, slow-glide channel with a hardpan bottom covered by a thin layer of silt. Once the silt was disturbed the stream channel became quite turbid. The severe channelization of this channel seemed to preclude any type of pool formation. Vegetation within the stream consisted of watercress and algae, both of which were particularly abundant along the stream edges. Riparian habitat for the north outflow consisted of common to abundant willow, occasional sedges, abundant grasses, rare mesic forbs, and occasional wild rose. Scuds were the predominant invertebrate, while nonnative snails and aquatic beetles were found infrequently. The northern outflow had the largest population of speckled dace, estimated to be 12,640 fish, at this spring.

The original outflow had very little water flow at the time of sampling. In addition, the water was choked with vegetation and did not appear to provide suitable habitat for the speckled dace (Stein 1995). Although if water flow were to be increased, suitable habitat for speckled dace would be available. No fish were found in this outflow in October 1995.

The southern outflow, another irrigation ditch, did not have any flowing water at the time of survey, though a substantial amount of standing water was present. It measured approximately 800 meters (2,625 feet) and had an extremely silty substrate (Stein 1995). No other observations were made for this outflow with respect to riparian vegetation, stream vegetation, and aquatic insects. The speckled dace population was estimated to be 500 fish.

Bradish Spring. Bradish Spring, located at the northeast corner of Signal Hill (Township 36 North, Range 62 East, Northeast ¼ of Section 19), has a total discharge of 0.01 cubic meter per second (0.03125 cubic foot per second) (George Jackson, Nevada State Water Engineer, personal communication [pers. comm.]). It is immediately impounded in two small reservoirs, both of which are approximately 20 x 20 meters (66 feet x 66 feet). Water leaves the upper reservoir through a standpipe and enters a covered irrigation pipe. Water seems to only enter the lower pond during periods of decreased irrigation demand when it overflows the upper pond through a corrugated pipe.

The upper reservoir appears to have filled to a depth of approximately 25.4 centimeters (10 inches) and width of 6.1 meters (20 feet) (Vinyard 1984). A heavy growth of aquatic vegetation abounds in the center of the upper reservoir. The lower reservoir has become completely overgrown and now resembles a seep. Both of the reservoirs have been heavily impacted by livestock use.

Independence Valley

Independence Valley Warm Springs. Ground water in Independence Valley is gained primarily from precipitation on the west slope of the Pequop Mountains and, to a lesser degree, from precipitation on the east side of Spruce Mountain Ridge and Wood Hills bordering both the southern and northwestern parts of the valley. The privately owned Independence Valley Warm Springs (formerly known as Ralph's Warm Springs and Big Springs) issues from several pools and seeps along a nearly 1.6-kilometer (1-mile) segment on the western edge of the valley and is a cool water spring (Eakin and Maxey 1951). Water temperature in 1951 was 18 degrees Celsius (65 degrees Fahrenheit), and the total water discharge was unknown. Hubbs *et al.* (1974) found the water temperature to be 26 degrees Celsius (79 degrees Fahrenheit), and the outflow was estimated to flow at 757–1135 liters per minute (200–300 gallons per minute) in 1965. In August 1983, the temperature of the water discharging from the upper reservoir was 29 degrees Celsius (84 degrees Fahrenheit) (Vinyard 1984). Apparently, the temperature of water discharging from the reservoir changes seasonally. No additional data are currently available regarding spring discharge.

The flows from Independence Valley Warm Springs are impounded into two reservoirs (Figure 3). The upper, and shallower of the two, is roughly 1.5 meters (5 feet) deep and 30 meters (98 feet) wide (Vinyard 1984). The lower reservoir is approximately 3 meters deep (10 feet) with a diameter of approximately 45 meters (148 feet). A dense mat of vegetation consisting mostly of stonewort (*Chara* sp.) with some *Myriophyllum* sp. (water milfoil) and *Ceratophyllum* sp. (hornwort) covered the bottom of the large reservoir. The edges of the pond were lined with pondweed. When flows are high, all flows from the upper reservoir entered the lower one. Water flows from the lower impoundment through a looping channel for 60 meters (200 feet) before entering a marsh. Once entering the marsh, the channel disappears, becoming eroded and shallow. Water depth in the channel ranged from 10 to 46 centimeters (4 to 18 inches), with a shallower water depth in the marsh (Vinyard 1984). Several small ponds occurred in the marsh area, one approximately 150 meters (492 feet) northeast of the lower reservoir and one approximately 350 meters (985 feet) to the southeast. Approximately 25 speckled dace were observed in October 1994. Several springheads located further south of this system have not been extensively mapped.

USGS-Biological Resources Division and U.S. Fish and Wildlife Service personnel surveyed the Warm Springs area in May 1997. In the marsh area of the system, a total of 373 speckled dace were trapped by biologists. The springs to the south of the Warm Springs complex were also surveyed, but no speckled dace were found. In July 1997, a total of 400 speckled dace from the marsh were trapped and measured. The last count of speckled dace in the marsh was 447 in October 1997. The area was also previously surveyed by the Nevada Division of Wildlife in 1996, and no fish were found in any of the springs, seeps, or marsh (Johnson 1996).

E. Life History and Habitat Requirements

Habitat

No other freshwater fish occupies a more widely distributed or variety of habitats than the speckled dace species (Moyle 1976). They are found throughout all major western drainage systems from the Colorado River south to Sonora, Mexico (Moyle 1976). Speckled dace primarily inhabit cool, flowing permanent streams and rivers. They are also successful in a variety of other areas such as warm permanent streams, lakes, outflows of desert springs, and warm intermittent streams. Throughout their range they are found primarily among rocks in riffles in streams and on rocky or sandy bottoms stirred by wave action in lakes.

Independence Valley speckled dace are found in a temperate, permanent desert stream/marsh fed by numerous springs. Although known as Independence Valley Warm Springs, these springs are not cited as thermal waters (Garside and Schilling 1979, Hose and Taylor 1974). The speckled dace are found primarily in the shallow water of the marsh of this spring system among the sedges and grasses. It is believed that they also occupied the stream, but were forced out due to predation by nonnative fish species such as rainbow trout, largemouth bass (*Micropterus salmoides*), and bluegill (*Lepomis macrochirus*). No data exist on the flow velocities or temperatures of habitat currently occupied by Independence Valley speckled dace, but preliminary data show the speckled dace inhabit a large portion of the marsh as well as two seep areas northeast of the marsh.

Clover Valley speckled dace are found primarily in reservoirs and outflows of the three spring systems: Clover Valley Warm Springs, Wright Ranch Spring, and Bradish Spring. There do not appear to be any associated marshes with these springs, only the outflows that have been heavily modified. The introduction of rainbow trout appears to have affected the speckled dace in the past. Details of Clover Valley speckled dace seasonal habitat requirements, population size, distribution over time, reproductive potential, and available habitat are unknown because access to the properties to conduct studies was not permitted in the past.

Food habits

Generally, speckled dace are characterized as diurnal (active during the daytime), bottom browsers that feed primarily on small invertebrates (such as aquatic insects), plant material, and zooplankton (floating, microscopic aquatic animals). This feeding pattern is further reflected by their subterminal mouth and short intestine; however, they will feed on large, flying insects at the water's surface and occasionally on eggs and larvae of other minnows when available. Several studies have documented seasonal diet changes (Jhingram 1948, Miller 1951); dace most often eat algae and detritus in the fall, bottom-dwelling insects in winter and spring, and flying insects in the summer. Based on the habitat they occupy, the Clover Valley and Independence Valley speckled dace probably have similar food preferences.

Reproduction

Specific reproductive patterns of the Clover and Independence Valley speckled dace subspecies have not been examined. Generally, speckled dace mature in their second summer. They are capable of spawning throughout the summer, but peak activity usually occurs in the months of June and July at water temperatures of 18 degrees Celsius (65 degrees Fahrenheit) (Sigler and Sigler 1979, Moyle 1976). Males congregate in spawning areas from which they remove debris to expose a bare patch of rock or gravel. The female is surrounded by males when entering a spawning area. Eggs are deposited underneath rocks, into spaces in the gravel, or close to the bottom and fertilized (Sigler and Sigler 1979, Moyle 1976). Eggs hatch in 6 days on average, and the larval fish, or fry, remain in the gravel for 7 to 8 days. After emerging from the gravel, the fry tend to concentrate in the warm shallows of streams.

F. Associated Species

In addition to the Independence Valley speckled dace, a second endemic species the Independence Valley tui chub (*Gila bicolor isolata*), is present in the Independence Valley Warm Springs system. The Independence Valley tui chub should be given extra consideration during recovery activities to promote the conservation of this species.

The Independence Valley tui chub descended from ancestors that inhabited the adjacent headwaters of the Humboldt River. These ancestors were presumably *Gila bicolor obesa*, a type very similar to the population inhabiting Bishop Creek, a tributary of the Humboldt River. Both endemic subspecies are dwarfed and sharply differentiated from other fishes found in the Lahontan drainage system. The dark color that extends onto the lower body leaves a wider unpigmented band than in other subspecies. Most Independence Valley tui chub have a highly distinctive black speckled midline at the base of the tail. The body is well-rounded and the snout moderately pointed. The diagonal mouth is indicative of a midwater feeder. The dorsal fin is positioned further back on the body than any other tui chub subspecies. Hubbs *et al.* (1974) provides a more complete description of the Independence Valley tui chub and comparison with other subspecies.

The Independence Valley tui chub was first collected in 1965 from the main reservoir and outflow at Independence Valley Warm Springs and was more numerous than Independence Valley speckled dace. It tended to occupy more midwater habitat than the speckled dace and was less inclined to take refuge in the vegetation. Surveys conducted in 1983 suggested the tui chub had been eliminated in the reservoir and its outflow (Vinyard 1984). Surrounding waters were also examined, and the Independence Valley tui chub was believed to be extinct, eliminated by introduced sport fish.

Independence Valley tui chub were collected in 1992, however, by Nevada Division of Wildlife biologists in several of the springs south of Warm Springs (Heinrich 1993). Nevada Division of Wildlife and U.S. Fish and Wildlife Service personnel also found tui chub present in a small, shallow pond 0.3 kilometer (1,000 feet) south of Warm Springs reservoir in October 1994. Fish were collected during the summer (June and August) of 1996 by Nevada Division of Wildlife biologists in two of the springs south of the Warm Springs complex. A total of 21 tui chub were found in one spring while 140 were trapped from the other. The Nevada Division of Wildlife estimates that at least three age classes, and possibly four, were present in the samples (Johnson 1996).

Additional survey efforts by Biological Resources Division personnel during May, July, and October of 1997 found tui chub in the marsh area of the Warm Springs complex. Only 1 tui chub was found in the fall sampling (October); tui chub were most numerous in the spring (May) with 27 fish collected. Although tui-chub remain in the system, the habitats historically preferred by them are inhabited by bass and bluegill. To successfully recover the chub, the nonnatives must be removed from the springs and the chub reintroduced or allowed to recolonize those areas. The sport fishery, if determined to be needed, could be relocated to an alternative site which the U.S. Fish and Wildlife Service would coordinate with the Nevada Division of Wildlife and other interested parties.

G. Reasons for Listing

Habitat alterations

Initial surveys for Clover Valley speckled dace in 1934 indicated that springs occupied by the speckled dace had been altered at a much earlier date. Outflows from the springs had been impounded into reservoirs before being distributed to various irrigation ditches. The habitat below the reservoirs was periodically dewatered on the irrigation schedule. At the time of listing, the irrigation usage continued, and speckled dace populations were restricted to habitats within the reservoirs and seasonally in the outflows. In the most recent survey (1995), populations of speckled dace were present at both the Clover Valley Warm Springs and Wright Ranch Spring areas. The outflows that were the most stable and/or had the greatest flow of water also had the largest number of speckled dace. At Bradish Spring, current population distribution trends and numbers are unknown.

The building and manipulation of reservoirs for irrigation was thought to be a serious threat to both speckled dace due to the reduction of available stream/outflow habitat and pond/reservoir habitat when water levels were regulated. Currently, in Independence Valley no lands are being irrigated for crop production, and no land has been used for crop production for over 10 years. The reservoirs and stream outflows have not been used for irrigation for approximately the same amount of time. The landowner has stated that no plans exist for irrigation to occur on the property the fish presently occupy.

Agricultural practices continue in Clover Valley today. It is probably unnecessary to discontinue these practices since the speckled dace continue to inhabit the spring systems; however, Bradish Spring has not been surveyed since 1984, and the status of speckled dace there is unknown. A cooperative plan between the U.S. Fish and Wildlife Service and the private landowners may help provide more habitat for speckled dace while maintaining and/or improving the irrigation practices.

Collecting

At the time of listing, the small population size and limited distribution of both speckled dace subspecies made them vulnerable to depletion by collection. Collection for scientific purposes of either speckled dace requires State and Federal permits at the present time. Commercial collection is prohibited by Federal law.

Competition and predation

Nonnative sport fishes are reported as preying upon and/or outcompeting native fishes. In many instances, such species have caused severe declines or the elimination of native fishes. Nonnative fish introductions are believed responsible for the loss of both subspecies of speckled dace from portions of their habitats. When the reservoirs were stocked with rainbow trout, largemouth bass, and bluegill, speckled dace were unable to inhabit those areas, likely due to predation and competition. Additionally, speckled dace were eliminated from the reservoir outflows.

In Independence Valley, largemouth bass and bluegill are found in the reservoir and bass are found in the upstream portion of the stream outflow and the larger eroded channels in the marsh; no speckled dace or tui chub are found in these areas. Bass are also found in the springs south of the Warm Spring complex, which do not contain tui chub. Largemouth bass are believed to have eliminated the Independence Valley tui chub from the reservoirs where it had been most abundant. Nonnative fishes pose a serious threat to the population of Independence Valley speckled dace. Elimination of sport fishes to recover both the speckled dace and tui chub will be an important component for the recovery of the fishes. Presently, no known habitats in Clover Valley are inhabited by nonnative sport fish; however, Bradish Spring has not been surveyed recently.

Other factors

Vandalism and the lack of any existing regulatory protection were also important reasons for listing these fish. While vandalism had never been known to affect either rare species, threats had been made that, if carried out, would have reduced or eliminated populations of both speckled dace. No existing State, Federal, county, or local regulatory protection mechanisms were in effect for either speckled dace at the time of listing except Nevada Revised Statute 504.295, which prohibited possession of any live wildlife without a license from the Nevada Division of Wildlife.

H. Resource Conflicts

Historically, the presumed resource conflict to the recovery of these fishes was the manipulation of water for irrigation purposes. While this may have been a serious concern when these fishes were listed, it does not currently appear to be a major threat to either speckled dace subspecies. Neither pasture nor agricultural land has been irrigated in Independence Valley for over 10 years. The current owner has assured the U.S. Fish and Wildlife Service that there are no plans to begin any irrigation projects. In Clover Valley, pasture continues to be irrigated, but the effect on the listed species is presumably minimal.

On a recent trip to Clover Valley, water from a natural channel had been diverted to form a new channel at the Clover Valley Warm Springs. Nevada Division of Wildlife and U.S. Fish and Wildlife Service personnel found speckled dace in both the partially dewatered channel and the newly flowing channel. This suggests that while irrigation manipulation may be a problem if outflows are frequently or quickly redirected, the opportunity exists to work closely with the landowner to accommodate the agricultural operations and the endangered speckled dace. The timing and amount of water being manipulated are the elements that should be determined to meet these needs.

In the past, both valleys have been popular sport fishing areas. Several observations previously identified rainbow trout, largemouth bass, and bluegill in the same spring systems as the listed fishes. Presumably, the sport fishes were stocked into the springs before anyone realized their potential impact. Since the two speckled dace subspecies were listed, bass and trout have not been stocked in Clover Valley except at Clover Valley Warm Springs. Nevada Division of Wildlife entered into an agreement in 1989 with the landowner to stock rainbow trout in the uppermost reservoir at Clover Valley Warm Springs on the condition that the landowner would implement conservation measures in the stream below to benefit the speckled dace. The ranch was sold in the early 1990's, and the agreement was discontinued. To date, no sport fish are stocked into Clover Valley speckled dace habitats.

Conversely, the reservoirs at Independence Valley Warm Springs continue to be a popular fishing area. Bluegill were established years ago and are still found in the reservoir (Johnson 1996). Despite the largemouth bass and bluegill in the reservoir and outflow, speckled dace persist in the marsh, but determining how the population is affected remains to be resolved. Removal of the nonnative fish and establishment of an alternative fishery at another location remains the most viable option for both speckled dace recovery and meeting angler needs.

I. Conservation Measures

State and Federal Protection

The Clover Valley speckled dace and the Independence Valley speckled dace were federally listed as endangered pursuant to the Endangered Species Act of 1973, as amended, on October 10, 1989 (U.S. Fish and Wildlife Service 1989). Federal agencies are required to consult with the Service under the provisions of section 7(a)(2) of the Endangered Species Act on any action that they fund, permit, or implement that may affect these species; however, there is little potential for impacts on speckled dace from Federal activities because both species are restricted to private lands.

The provisions of section 9 also make it illegal to ship, sell or offer for sale in interstate or foreign commerce any listed species, or part thereof, taken in violation of the Act. The Service also enforces the provisions of section 9 of the Act, which makes it illegal to harass, harm, pursue, hunt, shoot, wound, trap, capture, collect, or to attempt to engage in any such conduct. If a non-Federal action would result in the take of speckled dace, an incidental take permit, issued by the Service under section 10(a) of the Act would be required. Section 6 funding is provided to states for actions that will aid the recovery of listed species.

Prior to issuing a permit under the provisions of section 404 of the Clean Water Act, the U.S. Army Corps of Engineers is required to consult with the U.S. Fish and Wildlife Service for proposed activities to dredge and fill wetlands occupied by endangered or threatened species. No other potential Federal activities are known to be involved.

In addition to being protected by the provisions of the Act, both fish are protected by the State of Nevada, which prohibits taking of protected species without a valid State collecting permit (Nevada Administrative Code 503.065).

Cooperation from Private Landowners

Historically, access to private lands and the habitat for these fish has been limited, and data have not been consistently collected on the status of either listed speckled dace. Landowners can be of great assistance in the recovery of the speckled dace.

Their cooperation is needed to obtain population and distribution information that will be used to determine when the speckled dace have recovered. The owner of Independence Valley Warm Springs has given permission to do an extensive survey. The U.S. Fish and Wildlife Service is actively involved in trying to establish a cooperative relationship with the other landowners in Clover Valley.

To date, the U.S. Fish and Wildlife Service has met with concerned parties in both valleys to develop recovery strategies and objectives. One landowner in Clover Valley expressed a desire to delist the speckled dace. Permission was received from two of the three landowners in Clover Valley to do a one-time survey. Additional permission was received from the landowner in Independence Valley and the U.S. Fish and Wildlife Service has contracted with the Biological Resources Division to survey for seasonal population and habitat data and to map the area. Such cooperative efforts enable landowners to continue their operations while completing recovery actions for the species.

The recognition that the cooperation of private landowners in the conservation of many threatened and endangered species that occur on private lands will be necessary for the recovery of these species has led to the development of innovative policies and programs. All of these programs are voluntary and protect the rights of private property owners. These programs are available to private landowners interested in the recovery of listed species, and some of these programs may be helpful in the recovery of Clover Valley and Independence Valley speckled dace.

The U.S. Fish and Wildlife Service, the U.S. Department of Agriculture, and the Bureau of Land Management have developed a variety of voluntary programs to provide technical and financial assistance for landowners to implement conservation activities. These programs can provide for the needs of threatened and endangered species and wetlands by providing incentives to landowners; some involve cost-share agreements to help fund wildlife and habitat conservation on private lands. These voluntary programs are directed toward assisting landowners in improving water quality, reducing soil erosion, and enhancing grazing lands, irrigation facilities, and wildlife habitat. Frequently, enhancement of existing wetlands also improves the efficiency of irrigation systems and may provide increased economic returns.

One of the most direct means of developing a conservation agreement is through a Memorandum of Understanding (MOU) or Memorandum of Agreement (MOA). These agreements are signed by the Fish and Wildlife Service and a landowner and clarify responsibilities and actions of each participant. These agreements may involve some Federal funding.

The development of Habitat Conservation Plans is one way for private landowners to obtain permits, as provided by Section 10 of the Endangered Species Act, to conduct activities that may result in taking listed species incidental to otherwise legal activities. To receive a permit, a Habitat Conservation Plan is developed that describes likely impacts and what actions can be taken to avoid or minimize the impacts or to mitigate for impacts that cannot be avoided or minimized. The plan also describes the funding available for implementing the plan, procedures for dealing with unforeseen circumstances, alternative actions that are available and why they have not been selected for implementation, and other measures that may be unique to a particular situation.

Cost-share programs include matching funds provided by landowners with government funds to achieve mutually beneficial conservation efforts for the land and wildlife. Cost-share programs are managed by several agencies, including agencies within the Department of the Interior (U.S. Fish and Wildlife Service, Bureau of Land Management) and the Department of Agriculture (Farm Service Agency, Natural Resources Conservation Service, and Forest Service) as well as other funding sources such as the National Fish and Wildlife Foundation. The amount of funding, length of time the agreement is effective, and the responsibilities of the Federal agency and the landowners vary among the available programs.

The Partners for Fish and Wildlife program may be useful in helping achieve recovery of Clover Valley and Independence Valley Speckled Dace while meeting landowner land management and economic needs. The Partners for Fish and Wildlife program is a U.S. Fish and Wildlife Service program designed to improve and protect fish and wildlife habitat on private lands through cooperative efforts between the landowner, the Fish and Wildlife Service, and other interested parties. Private individuals can make voluntary improvements to their land to enhance or restore wildlife with the Fish and Wildlife Service providing technical assistance. Some funding is available, and non-Fish and Wildlife Service contributions are encouraged. The ratios between Federal and other funding vary among projects.

Another Fish and Wildlife Service partnership grant program, Partnerships for Wildlife, is administered by the Fish and Wildlife Service's Regional Federal Aid Office. The program establishes partnerships to carry out wildlife conservation projects for a diversity of species, provides opportunities for nonconsumptive wildlife activities for the public, assists State agencies with their wildlife conservation responsibilities, and encourages private donations for wildlife conservation and appreciation projects. There are three funding sources: Federal, State, and private. Federal funds are provided to State fish and wildlife agencies; the States provide matching funds and accept monetary donations and in-kind donations from the private sector. This program is a potential source of funding for the Nevada Department of Wildlife to complete recovery tasks for speckled dace.

Under the Challenge Cost Share Program, the Fish and Wildlife Service can provide up to 50 percent of the total cost for wetland restoration, enhancement, or management projects on private lands. Landowners may provide, material, equipment, water, or other in-kind services to meet their 50 percent cost share. A voluntary program administered by the Department of Agriculture is the Wildlife Habitat Incentive Program, which is directed at developing habitat for fish and wildlife on private land. Cost-share assistance is provided by the

Department of Agriculture for the initial implementation of habitat development. Another potential source of funding for conservation of listed species on private lands is the National Fish and Wildlife Foundation, a nonprofit organization established by Congress in 1984 and dedicated to the conservation of fish, wildlife, and plants. Its goals include species habitat protection, natural resource management, and habitat and ecosystem rehabilitation, among others. Challenge grants are awarded using federally appropriated funds and private funds for conservation activities. Congressional appropriations, which are used exclusively for project support, must be matched on at least a 1:1 basis by private, non-Federal contributions. The U.S. Fish and Wildlife Service works with state agencies and others in developing and reviewing proposals.

J. Recovery Strategy

The owners of the lands supporting these species can be of great help in the recovery of the speckled dace. Prior to initiating recovery measures for either speckled dace subspecies, permission must be obtained to access private lands, and conduct seasonal surveys of known habitats. All speckled dace habitat for both fishes, occupied and historical, should be examined for suitability. Though neither task may be perceived initially as essential to prevent extinction, both are necessary before recovery may begin. A complete seasonal inventory for either speckled dace subspecies within its occupied habitat has not been completed since listing. It is also unknown whether the habitat occupied by both speckled dace is preferred or is marginal and the only habitat available to the speckled dace. Both of these species occur only on private land. Landowner permission is necessary to complete the extensive studies needed and to implement recovery measures for the purpose of downlisting or delisting.

As previously described, several programs and policies are available to assist landowners in their efforts to aid recovery of the speckled dace. These programs also provide assurances to landowners that they will not be adversely affected by supporting endangered species recovery efforts, and these programs may help meet agricultural or economic needs as well. Funding for fish and wildlife and wetland restoration and enhancement projects on these private lands (see "I. Conservation Measures") can be explored with willing landowners. In addition, landowners may wish to pursue the development of Habitat Conservation Plans, memoranda of understanding, and a variety of cooperative agreements, which can be adapted to individual circumstances.

Equally important to the recovery of the Independence Valley speckled dace will be removal and relocation of the largemouth bass and bluegill that currently inhabit the stream, segments of the marsh, and the reservoir at Independence Valley Warm Springs, habitats that were historically available to both speckled dace and Independence Valley tui chub. In order to reestablish both native species, the bass would have to be removed or controlled. Since the ranch is a fairly popular fishing area, the bass could be relocated nearby to protect the Independence Valley speckled dace and still provide a sport fishery. The decision on how to manage bass would be reached cooperatively by a Participation Team composed of State, local, and Federal agencies, private landowners, and others.

II. RECOVERY

A. Objective and Criteria

The objective of this recovery plan is to stabilize and maintain the populations of both the Clover Valley and Independence Valley speckled dace and their habitats so that both fishes may be removed from the Federal list of endangered and threatened species. This recovery plan also addresses research needs and habitat improvements for each of the aquatic systems and one species of concern. All recovery criteria are preliminary and may be revised on the basis of new information (including research specified as recovery tasks). If recovery actions are undertaken as scheduled by 1998, both species could be recovered by 2005.

Independence Valley speckled dace may be considered for reclassification from endangered to threatened when

1. The population at Independence Valley Warm Springs comprises at least two age classes, the population size is stable or increasing, and reproduction is documented for at least 3 consecutive years, and

2. Nonnative fishes no longer adversely affect the long-term survival of the Independence Valley speckled dace.

The Independence Valley speckled dace may be considered for delisting provided that all reclassification criteria have been met and when

1. Independence Valley speckled dace occupy at least 75 percent of the total available habitat after enhancement, if needed, within the Independence Valley Warm Springs system,

2. The population exists at the aforementioned level (downlisting criteria) for a minimum of one generation (approximately 7 years), and

3. Long-term protection of speckled dace populations from nonnative fish and other factors, and speckled dace habitat at Independence Valley Warm Springs is guaranteed.

Clover Valley speckled dace may be considered for reclassification from endangered to threatened when the population at each of the three springs (Clover Valley Warm Springs, Wright Ranch Spring, and Bradish Spring) comprises at least two age classes, a stable or increasing population size, and reproduction is documented for at least 3 consecutive years.

Clover Valley speckled dace may be considered for delisting provided that all reclassification criteria have been met and when

1. Clover Valley speckled dace occupy at least 75 percent of the total available habitat after enhancement, if needed, within each spring system (Clover Valley Warm Springs, Wright Ranch Spring, and Bradish Spring),

2. The population exists at the aforementioned level (downlisting criteria) for a minimum of one generation (approximately 7 years), and

3. Long-term protection of speckled dace populations and habitat is guaranteed for each of the three springs (Clover Valley Warm Springs, Wright Ranch Spring, and Bradish Spring).

Prior to implementation of any task in this plan, the lead Federal agency must comply with all applicable provisions of the National Environmental Policy Act and the Endangered Species Act of 1973, as amended. All necessary Federal, State, and local permits or authorizations must be obtained. Landowner permission must be obtained if an activity is to occur on private lands.
These recovery criteria were designed to provide a basis for consideration of delisting, but not for automatic delisting. Before delisting of either species may occur, the U.S. Fish and Wildlife Service must determine that the following five listing factors (as discussed previously) are no longer present or continue to adversely affect the listed species: (1) the present or threatened destruction, modification, or curtailment of the species' habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; and (5) other human-made or natural factors affecting the continued existence of the species (50 CFR 424.11). The final decision regarding delisting will be made only after a thorough review of all relevant information.

B. Narrative Outline of Recovery Actions

Those tasks specific to each fish will be discussed as such; otherwise the tasks will be discussed as pertaining to both fish and both areas.

1. Conserve, restore, and manage Clover Valley and Independence Valley speckled dace habitats.

All populations of the Clover Valley and Independence Valley speckled dace are restricted to private properties. Because of their limited distribution, habitats within the Bradish Spring, Wright Ranch Spring, Clover Valley Warm Springs, and Independence Valley Warm Spring should be conserved and managed. Comprehensive management of the habitat of both fishes will require cooperation among property owners, State and Federal agencies, and other concerned or knowledgeable entities.

1.1 Work with willing landowners to carry out recovery actions.

Landowners may provide cooperation and support during the planning and implementation phases of the management plan. A landowner's permission and cooperation is needed to complete any of the research tasks or habitat improvements that may be needed for downlisting and delisting these fishes. Currently, the Independence Valley speckled dace occupies habitat found on only one private landowner's property at Independence Valley Warm Springs. The Clover Valley speckled dace is found on three different private landowners' properties: Clover Valley Warm Springs, Wright Ranch Spring, and Bradish Spring. Measures undertaken to protect and restore Independence Valley speckled dace should also benefit the Independence Valley tui chub.

1.1.1 Negotiate cooperative agreements with willing landowners in Clover and Independence Valleys.

Cooperative agreements should be negotiated with willing private landowners. These agreements are always voluntary on the part of the landowner and would be used to access the property for purposes of baseline inventories, long-term monitoring, research, and habitat restoration. Once habitat is restored and management plans have been developed, long-term protection of speckled dace populations and habitat must be assured for delisting to be considered.

Cooperative agreements can take a variety of forms, including Memoranda of Understanding or Memoranda of Agreement, which delineate the actions and responsibilities of each participant signing such an agreement. Contracts to provide for long-term restoration and protection of fish and wildlife habitat and wetlands, which may be developed under cost-sharing programs described under "Conservation Measures", will vary in the length of time they are effective, based on the type of cooperative agreement. Projects funded under cost-sharing programs must meet the requirements of those programs, which may include a minimum effective time period for contracts.

1.2 Manage nonnative fish impacts to the Independence Valley speckled dace.

Surveys have documented the presence of largemouth bass and bluegill in the reservoir, marsh, and outflow of the Independence Valley Warm Springs area, as well as springs south of the reservoir. Competition and predation from nonnative fishes in other spring systems has been well-documented. The continued presence of nonnative fishes limits the recovery of Independence Valley speckled dace due to adverse effects on reproduction, recruitment, population distribution, and habitat use.

Avenues for maintaining a fishery in the area would be explored because the reservoir has been a popular fishing area for local people. Alternatives may include establishing a fishery at another site outside of speckled dace habitat within the valley or establishing the fishery at another site outside of the valley but in close proximity. Physical removal of bass and bluegill should be used whenever possible to minimize effects on the Independence Valley speckled dace and tui chub; however, chemical methods may be necessary in some areas where flows, depth, and/or cover make physical removal infeasible.

1.3 Develop and implement habitat restoration/management plans.

Habitat restoration/management plans should be developed in cooperation with landowners for all occupied habitats (Independence Valley Warm Springs, Clover Valley Warm Springs, Bradish Spring, and Wright Ranch Spring). Each of these systems will benefit from restoration as they have experienced some perturbations. Restoration work will be guided by data gathered on historical, physical, and chemical habitat conditions in each of these springs.

Restoration and management may vary among the springs systems and may include:

(1) Restoration and management actions to improve habitat quality through restoration of riparian habitat, removal of some vegetation from spring outflow channels and/or reservoirs, assessing and modifying the potential impacts of existing grazing prescriptions while meeting the biological requirements of speckled dace, and adjustments to timing and water levels during irrigation.

(2) Restoration and management of habitat to provide for specific speckled dace life history requirements may include developing feeding

areas, creating spawning and nursery habitats in the spring systems, and creating contiguous speckled dace habitat within all areas of each springs' outflow.

2. Determine Clover Valley and Independence Valley speckled dace biology and habitat requirements.

All earlier efforts to monitor both speckled dace have been sporadic, have not covered the entire range of each species, and monitoring techniques have varied. Recovery of both species will require (1) implementation of a monitoring program for gauging population trends and habitat conditions and (2) new research on various aspects of each speckled dace's biology and habitat requirements.

2.1 Develop and implement a monitoring program.

The monitoring program should include provisions for collection and analysis of baseline and periodic information on Clover Valley and Independence Valley speckled dace, which would be used for assessing population trends and habitat condition. Monitoring data will be used to determine whether or not recovery criteria for reclassification and delisting have been met. These criteria set requirements for both speckled dace's abundance, population structure, and distribution. Monitoring will also provide data to evaluate the effectiveness of habitat restoration and management and nonnative species eradication measures. Additionally, potential problems, such as nonnative species reinvasions, can be identified in a timely manner during routine population monitoring.

The monitoring program and ultimately both speckled dace's recovery is dependent upon a commitment from all involved parties for a long-term, range-wide information collection. The monitoring plan should be developed by biologists in cooperation with property owners and other affected and/or interested parties. Access to all speckled dace habitats (Independence Valley Warm Springs, Clover Valley Warm Springs, Bradish Spring, and Wright Ranch Spring) will require coordination with and cooperation of landowners. Monitoring activities should not deviate from the program developed in cooperation with the landowners and affected parties. If substantive changes are deemed important to the recovery of either speckled dace, affected parties must be contacted to ensure that the new work is not in conflict with other activities occurring in these areas.

2.1.1 Collect baseline information.

Although both speckled dace have been periodically surveyed since their discovery, the resulting information does not provide an adequate baseline for gauging population trends for either fish. The most recent study in Clover Valley, a one-time survey, focused on the Clover Valley Warm Springs and Wright Ranch Spring areas. No detailed information is available regarding speckled dace numbers, extent and condition of the habitat, for other seasons, or for Bradish Spring. Information on speckled dace numbers, occupied habitat, potential habitat, and habitat conditions for all seasons in all three spring systems (Clover Valley Warm Springs, Bradish Spring, and Wright Ranch Spring) should be collected to establish a baseline for future monitoring of the Clover Valley populations and habitat trends. A study for the Independence Valley speckled dace was recently contracted to begin collecting data for seasonal population numbers, distribution, and habitat requirements.

2.2 Develop baseline maps using Geographic Information System (GIS) technology.

A baseline map will be developed for the Independence Valley speckled dace and an associated species of concern, the Independence Valley tui chub. Since most of the Independence Valley Warm Springs encompasses not only a spring, associated outflow and a large marsh area, the map is important for determining existing and potential habitat for all seasons. Map development will be accomplished through the use of Geographic Information System (GIS) technology, which will facilitate analysis of trends in population numbers and changes in seasonal habitat use. Similar efforts should be conducted for Clover Valley speckled dace.

2.3 Determine life history characteristics of Clover Valley speckled dace and Independence Valley speckled dace.

Specific data is needed on the biology of these two subspecies. Much of the life history information is now based on speckled dace in general. Data on life cycles and habits will be used to develop methods to restore habitat for spawning, nursery, and feeding.

2.4 Determine habitat requirements for Clover Valley and Independence Valley speckled dace.

Habitats of these two subspecies differ from each other and from most species of speckled dace whose biological requirements have been used to reach conclusions about Clover Valley and Independence Valley speckled dace biology. Independence Valley speckled dace are found in temperate, permanent desert stream/marsh fed by numerous springs and Clover Valley speckled dace are found primarily in reservoirs and outflows of spring systems. Data is needed for each speckled dace on flow velocities, temperatures, extent/amount of habitat needed, seasonal differences in habitat used, spawning and nursery habitats, and water quality tolerances. Information on factors that may influence these habitat requirements includes the impacts of vegetation in spring outflows and reservoirs, assessment of aquatic and riparian vegetation cover, analysis of potential land-use practices, and timing of water flows and water levels for irrigation.

3. Provide public information and education.

Recovery of both speckled dace will be dependent, in large part, on the interest and willing cooperation of the private property owners and other members of the local community. An effective outreach program would foster positive sentiment for the recovery process and create an avenue for involvement and support among property owners, other members of the public, and the resource management agencies.

3.1 Develop and implement participation plans.

Participation plans should be developed and implemented to involve appropriate agencies and property owners in the recovery process. The involved parties should be continually included in and updated on all aspects of the recovery effort. Each participation plan should provide the basis for cooperation among interested and affected parties and should address either Clover Valley and Independence Valley speckled dace recovery as well as economic and other concerns. Plans will include a schedule for on-going meetings between the Fish and Wildlife Service and stakeholder interests.

3.2 Develop and implement and outreach program.

A public-outreach program should be developed and implemented to inform and update local governments and interested members of the community of recovery efforts for both fish. Appropriate avenues (e.g., public meetings, newspaper articles, interpretive displays, etc.) should be identified and developed to disseminate information on the status and habitat requirements of both fish and the actions needed to recover each of them.

4. Evaluate progress of recovery, effectiveness of management and recovery actions, and revise management plans and recovery criteria as necessary.

As more information becomes available through the completion of recovery tasks, recovery strategies and criteria should be reassessed. Results of consistent standardized surveys and monitoring, research to determine the life history needs, identification and management of threats, and analyses of the role of land-use activities will provide the basis for evaluation of the success of management plans and refining approaches to management and recovery.

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IV. IMPLEMENTATION SCHEDULE

This implementation schedule outlines actions and estimated costs for the recovery of the Clover and Independence Valley speckled dace. It is a guide for meeting the objective discussed in Part II of this Recovery Plan. This schedule indicates task priorities, numbers, and descriptions; duration of each task; responsible parties; and estimated costs. These actions, when accomplished, should bring about the recovery of both listed fishes and protect their habitat, as well as provide for the conservation of other native fish. It should be noted that the estimated monetary needs for all parties involved in recovery are identified and, therefore, this schedule reflects the total estimated financial requirements for the recovery of these species.

In the implementation schedule, tasks are arranged in priority order. The assigned priorities are defined as follows:

Priority 1 - An action that must be undertaken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

Priority 2 - An action that must be undertaken to prevent a significant decline in population or habitat quality, or some other significant negative impact short of extinction.

Priority 3 - All other actions necessary to meet the recovery objectives.

Key to Acronyms Used in the Implementation Schedule:

FWS = U.S. Fish and Wildlife Service
BRD = Biological Resources Division of the U.S. Geological Survey
PL = Private Landowner
NDOW = Nevada Division of Wildlife
IVSD = Independence Valley Speckled Dace

Key to Other Codes Used in the Implementation Schedule:

* Lead Agency
Continual (Cont.) = Task will be implemented on an annual basis once it is initiated and will continue until no longer required for recovery.
Total Cost = Projected cost of task from start to task completion.

Recovery Plan Implementation Schedule for the Clover and Independence Valley Speckled Dace

Priority Number	Task Number	Task Description	Task Duration (Years)	Responsible Parties	Total Cost ($1,000's)	Cost Estimates ($1,000's)				
						FY 1998	FY 1999	FY 2000	FY 2001	FY 2002
1	1.1.1	Negotiate cooperative agreements with willing landowners	1	FWS NDOW PL	18 10	18 10				
1	1.2	Manage nonnative fish impacts to IVSD	3	FWS BRD	90	30	30	30		
1	2.1	Develop and implement a monitoring program	10	BRD FWS NDOW	96 20 10		10 2 1	10 2 1	10 2 1	10 2 1
1	2.1.1	Collect baseline information	2	BRD FWS NDOW	30 16 4	15 8 2	15 8 2			
2	1.3	Develop and implement habitat restoration/ management plans	10	FWS NDOW	150 20	15 2	15 2	15 2	15 2	15 2

Recovery Plan Implementation Schedule for the Clover and Independence Valley Speckled Dace

Priority Number	Task Number	Task Description	Task Duration (Years)	Responsible Parties	Total Cost ($1,000's)	Cost Estimates ($1,000's)				
						FY 1998	FY 1999	FY 2000	FY 2001	FY 2002
2	2.2	Develop GIS maps	2	BRD FWS	70 5	35 3	35 2			
2	2.3	Determine life history characteristics	3	BRD FWS	90 10	30 3	30 4	30 3		
2	2.4	Determine habitat requirements	3	BRD FWS	40 5	15 2	15 1	10 1		
3	3.1	Develop and implement participation plan	Continuous	FWS PL	24 TBD	12 TBD	3 TBD	3 TBD	3 TBD	3 TBD
3	3.2	Develop and implement outreach program	Continuous	FWS PL	30 TBD	6 TBD	6 TBD	6 TBD	6 TBD	6 TBD
3	4	Evaluate progress and revise plans and criteria	10	FWS	20	2	2	2	2	2

V. APPENDICES

APPENDIX A. PUBLIC/PEER REVIEW

The draft recovery plan was made available to the public for comment as required by the 1988 amendments to the Endangered Species Act of 1973. The public comment period was announced in the Federal Register on October 22, 1997, and closed on December 29, 1997. Copies of the draft plan were provided to qualified members of the academic and scientific community for peer review. The U.S. Fish and Wildlife Service (Service) solicited and/or received comments on the document from the academic and scientific community, private individuals, industry representatives, and Federal, State, and local agencies listed below. Before completion of this final recovery plan, the Service received a total of four response letters, as indicated by an asterisk (*). The comments provided in these letters were considered in preparation of this final recovery plan and incorporated, as appropriate. Other significant comments are addressed by the Service in Appendix B. All letters of comment on the plan are on file at the Service's Reno Fish and Wildlife Office in Reno, Nevada.

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APPENDIX B. SIGNIFICANT PUBLIC COMMENTS AND SERVICE RESPONSES

This section consolidates, summarizes, and provides the Fish and Wildlife Service's (Service) response to significant comments not addressed by changes in the text. Specific comments that reoccurred in the letters are addressed only once.

Comment 1: It is unrealistic to expect private landowners to enter into the cooperative agreements mentioned in the recovery plan and to expend the amounts of money estimated in the recovery plan.

Response: Entering into these agreements is always voluntary on the part of the landowner. The amounts of money for cooperative agreements are estimates of the monetary value of certain actions. The main requirements for the landowner are usually access to the property and providing opportunities for habitat restoration, or providing assistance for the types of agreements that require "matching funds."

Comment 2: The Service should only expect landowners to enter into cooperative agreements in which the landowners would not introduce any nonnative fishes onto their property or use any aquatic chemicals that may harm the fish.

Response: The Service will pursue this type of agreement as well as other agreements previously mentioned in the plan.

Comment 3: The commenter felt that instead of having a viable population of the Clover Valley speckled dace in all three populations before delisting, each spring system should be considered separately.

Response: The Endangered Species Act includes "distinct vertebrate population segments" under its definition of species. The Service's policy regarding distinct vertebrate population segments (61 FR 4722) recognizes three criteria: (1) discreteness, (2) significance of the population segment to the taxon, and (3) the conservation status of the population segment (i.e., is the status of the population threatened or endangered when it is treated as if it were a species?). The Service could delist a spring population if the distinct vertebrate population criteria have been met and the spring population has recovered. The Service, however, does not have information indicating the three springs represent distinct vertebrate population segments. Even without the recognition of distinct vertebrate population segments, the flexibility of the Endangered Species Act would allow restrictions to be lessened as the populations improve.

Comment 4: What is the relationship between the Service and the U.S. Geological Survey-Biological Resources Division (USGS-BRD)?

Response: The Service and the U.S. Geological Survey are both agencies within the Department of the Interior. The Biological Resources Division of USGS works cooperatively with Federal and State agencies and provides the scientific understanding and technologies needed to support the sound management and conservation of the Nation's biological resources. The majority of BRD programs and resources remain directed towards the needs and responsibilities of Interior resource management bureaus, which can include research needs of the Service. The Service may provide funds to USGS-BRD to accomplish some of the tasks identified in this plan.

Comment 5: Is there a need for genetic evaluation of these subspecies to confirm their validity?

Response: The Service believes that the current literature adequately documents the taxonomy of these species. If through the course of conducting the research tasks identified in this plan, questions on the taxonomy of the species arise, the Service would encourage research to answer those questions.

END

08-24-98